

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) A battery state diagnosing device comprising:

a load applying section applying a load to a battery;

a measuring section measuring input and output characteristics of the battery in response to the applied load; and

a diagnosing section diagnosing a state of the battery by applying a transient result obtained from the measurement to a mathematical expression obtained by a system identification method, wherein

said battery state diagnosing device applies the load to the battery as a current load.
2. (Cancelled)
3. (Cancelled)
4. (Previously Presented) The battery state diagnosing device as set forth in claim 16, wherein:

in order to remove the perpendicular component from the terminal voltage, a voltage value at a rise of a voltage pulse representing the electromotive force component of the battery is calculated from a voltage wave form of the terminal

voltage, and the calculated value of the voltage pulse is subtracted from the terminal voltage.

5. (Previously Presented) A battery state diagnosing device comprising:
a load applying section applying a current to a battery,
a measuring section measuring input and output characteristics of the battery in response to the applied load, and
a diagnosing section diagnosing a state of the battery by applying a result of the measurement to a mathematical expression obtained by a system identification method, wherein
the load applying section applies a current to the battery when the battery is not supplied with fuel.

6. (Previously Presented) A battery state diagnosing device for applying load to a battery, measuring input and output characteristics of the battery, and diagnosing a state of the battery by applying a result of the measurement to a mathematical expression obtained by a system identification method, said battery state diagnosing device comprising:

a circuit section for constituting a closed circuit by serially connecting the battery to a current load when diagnosing the battery;

a measuring section, connected to the circuit section, for measuring a terminal voltage of the battery and a current flowing in the circuit section; and

a diagnosing section for diagnosing, by the system identification method, a state of the battery based on a transient result obtained from the measurement by the measuring section.

7. (Previously Presented) A battery state diagnosing device for applying a current to a battery, measuring input and output characteristics of the battery, and diagnosing a state of the battery by applying a result of the measurement to a mathematical expression obtained by a system identification method, the battery being a fuel cell that is not supplied with fuel,

said battery state diagnosing device comprising:

a circuit section for constituting a closed circuit by serially connecting the battery to a voltage source when diagnosing the battery;

a measuring section, connected to the circuit section, for measuring a terminal voltage of the battery and a current flowing in the circuit section; and

a diagnosing section for diagnosing, by the system identification method, a state of the battery based on a result of the measurement by the measuring section.

8. (Currently Amended) A battery state diagnosing method comprising the steps of:

applying a load to a battery;

measuring input and output characteristics of the battery in response to the applied load; ~~and~~

diagnosing a state of the battery by applying a transient result obtained from the measurement to a mathematical expression obtained by a system identification method; ~~wherein ; and~~

outputting the state of the battery diagnosed in the diagnosing step.

wherein

said step of applying a load to the battery serially connects the battery to a current load.

9. (Cancelled)

10. (Cancelled)

11. (Previously Presented) The battery state diagnosing method as set forth in claim 18, wherein:

in order to remove the perpendicular component from the terminal voltage, a voltage value at a rise of a voltage pulse representing the electromotive force component of the battery is calculated from a voltage wave form of the terminal

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voltage, and the calculated value of the voltage pulse is subtracted from the terminal voltage.

12. (Currently Amended) A battery state diagnosing method comprising the steps of:

applying a current to a battery,

measuring input and output characteristics of the battery in response to the applied current, and

diagnosing a state of the battery by applying a result of the measurement to a mathematical expression obtained by a system identification method; wherein ; and

outputting the state of the battery diagnosed in the diagnosing step,

wherein

the current is applied to the battery when the battery is not supplied with fuel, and

said step of applying a current serially connects the battery to a voltage source.

13. (Cancelled)

14. (Cancelled)

15. (Previously Presented) A battery state diagnosing device comprising:

- a load applying section applying a load to a battery;
- a measuring section measuring input and output characteristics of the battery in response to the applied load; , and
- a diagnosing section diagnosing a state of the battery by applying a result of the measurement to a mathematical expression obtained by a system identification method, wherein

said battery state diagnosing device applies the load to the battery as a current load;

the measured output characteristic is a terminal voltage of the battery;

and

when diagnosing the battery by system identification, an electromotive force component of a fluctuating terminal voltage of the battery is removed as a bias, and a voltage fluctuation after the electromotive force component has been removed is amplified and used for the diagnosis by the system identification.

16. (Previously Presented) A battery state diagnosing device comprising:

- a load applying section applying a load to a battery;
- a measuring section measuring input and output characteristics of the battery in response to the applied load; and

a diagnosing section diagnosing a state of the battery by applying result of the measurement to a mathematical expression obtained by a system identification method, wherein

said battery state diagnosing device applies the load to the battery as a current load;

the measured output characteristic is a terminal voltage of the battery;
and

when diagnosing the battery by a system identification, a fluctuating terminal voltage of the battery is separated into a perpendicular component which derives from a serial resistance of the battery, and a component representing Capacitance-Resistance dynamics;

the perpendicular component is removed from the terminal voltage; and
a voltage fluctuation after the perpendicular component has been removed is amplified and used for the diagnosis by the system identification.

17. (Currently Amended) A battery state diagnosing method comprising the steps of:

applying a load to a battery;

measuring input and output characteristics of the battery in response to the applied load; ~~and~~

diagnosing a state of the battery by applying a result of the measurement to a mathematical expression obtained by a system identification method; ~~wherein ; and~~

outputting the state of the battery diagnosed in the diagnosing step,
wherein

said step of applying a load to the battery serially connects the battery to a current load;

the measured output characteristic is a terminal voltage of the battery;
and

when diagnosing the battery by system identification, an electromotive force component of a fluctuating terminal voltage of the battery is removed as a bias, and a voltage fluctuation after the electromotive force component has been removed is amplified and used for the diagnosis by the system identification.

18. (Currently Amended) A battery state diagnosing method comprising the steps of:

applying a load to a battery;

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measuring input and output characteristics of the battery in response to the applied load; ~~and~~

diagnosing a state of the battery by applying a result of the measurement to a mathematical expression obtained by a system identification method; ~~wherein ; and~~

outputting the state of the battery diagnosed in the diagnosing step,
wherein

said step of applying a load to the battery serially connects the battery to a current load;

the measured output characteristic is a terminal voltage of the battery;
and

when diagnosing the battery by a system identification, a fluctuating terminal voltage of the battery is separated into a perpendicular component which derives from a serial resistance of the battery, and a component representing Capacitance-Resistance dynamics;

the perpendicular component is removed from the terminal voltage and a voltage fluctuation after the perpendicular component has been removed is amplified and used for the diagnosis by the system identification.

19. (Cancelled)

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20. (Cancelled)

21. (Cancelled)

22. (Cancelled)

23. (Previously Presented) A battery state diagnosing method comprising:

a load applying section applying a load to a battery;

a measuring section measuring input and output characteristics of the battery in response to the applied load; and

a diagnosing section diagnosing a state of the battery by applying a transient result obtained from the measurement to a mathematical expression obtained by a system identification method, wherein

said battery state diagnosing device applies the load to the battery as a current load,

wherein the measured output characteristic is a terminal voltage of the battery; and

the diagnosing section removes an electromotive force component of a fluctuating terminal voltage of the battery to obtain the transient result, and amplifies this transient result for diagnosis by the system identification.

24. (Previously Presented) A battery state diagnosing method comprising:

a load applying section applying a load to a battery;

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a measuring section measuring input and output characteristics of the battery in response to the applied load; and

a diagnosing section diagnosing a state of the battery by applying a transient result obtained from the measurement to a mathematical expression obtained by a system identification method, wherein

said battery state diagnosing device applies the load to the battery as a current load,

wherein the measured output characteristic is a terminal voltage of the battery; and

the diagnosing section is operable to;

separate a fluctuating terminal voltage of the battery into a perpendicular component which derives from a serial resistance of the battery, and a component representing Capacitance-Resistance dynamics;

remove the perpendicular component from the terminal voltage to obtain the transient result; and

amplify the transient result obtained after the perpendicular component has been removed for diagnosis by the system identification.